

A Contribution towards a Knowledge of the Neotropical THYSANOPTERA.

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(PLATES 51-53.)

[Read 17th March, 1910.]

I HAVE recently had the pleasure of examining two small collections of Thysanoptera from Central America, which were submitted to me through the kindness of Dr. Meinert (Copenhagen) and Mr. G. C. Champion (on behalf of Messrs. Godman and Salvin), to whom my thanks are due. I am also grateful to Prof. Bouvier for the opportunity of examining the material in the Paris Museum, and include the description of a single species, *D. nitidus*, from this latter collection. Part of the material sent by these gentlemen has already been described*, and it will be noticed that, though the collections are small as regards the number of specimens, they include a large number of very interesting forms, the chief interest lying, perhaps, in the comparatively large number of species referable to certain genera or groups of genera. Thus in the allied genera *Idolothrips*, Haliday, and *Dicaiothrips*, Buffa, we find no less than twelve species: *I. longiceps*, Bagnall, *I. assimilis*, Bagnall, *I. affinis*, Bagnall, *I. angustatus*, sp. n., *D. foveicollis* (Bagnall), *D. nitidus*, sp. n., *D. grandis*, sp. n., *D. Championi*, sp. n., *D. levi-collis*, sp. n., *D. propinquus*, sp. n., *D. distinctus*, sp. n., and *D. brevicornis*, sp. n.; these genera apparently finding their headquarters in Central America. Again, in the closely allied genera *Liothrips*, Uzel, and *Diceratothrips*, Bagnall, we are able to record at least five forms.

So far as possible I have endeavoured to figure each of the species here described, so as to show more clearly differences that are difficult to explain in words. Owing to the small amount of material at my disposal, especially as regards the genus *Dicaiothrips*, I hesitated long before admitting the rights of certain forms to specific rank, but I firmly believe that in each case the characters I have used are good and valuable ones, the relative lengths of the abdominal segments being, in my opinion, especially useful.

Further, many of the specimens were dried and mounted, and others, again, were preserved in alcohol, some of these latter being distended, and thus demanding the utmost care in their discrimination and description. It would have been, in every way, more satisfactory if one could have examined a larger mass of material, and it is to be hoped that further collections may be made in the near future, together with observations as to the habits, etc., of these much-neglected insects.

* Trans. Nat. Hist. Soc. of Northumberland, Durham, and Newcastle-upon-Tyne, n. s. pp. 183-217, pls. 6 & 7 (1908); Journ. Linn. Soc., Zool. xxx. pp. 329-335, pl. 46 (1909).

I have attempted on Pl. 52. figs. 5a & 5b, to figure the ventral side of the ninth abdominal segment of the male *Dicaiothrips lævicollis*, and believe that upon examination of an extensive series the genital characters in the male (and probably in the female also) will prove to be of some taxonomical importance.

I have also endeavoured (Pl. 53. fig. 16) to delineate the basal part of the fore-wing in *Diceratothrips armatus*, drawing particular attention to a light patch that does not appear to be so strongly membranous as the surrounding parts, and is also protected by two bristles. I have thought that this may probably be a sense-area, and believe that it has not before been noted.

Genus DICAIOTHRIPS, Buffa, 1909.

Dicaiothrips, Buffa, 'Redia,' v. fasc. 2, p. 169 (March 1st, 1909).

This genus was erected recently by Prof. Buffa and is a difficult one to diagnose with satisfaction, though there can be no doubt that the genus is a good one and quite distinct from *Idolothrips*. The species are, as a rule, larger and more massively built than in *Idolothrips*; the cheeks of the head, and the fore-legs also (which latter are often considerably enlarged in the male), are very profusely set with spines; the fore-tarsal tooth is very large in the male, and scarcely noticeable in the female, whilst in the first-named sex the abdomen is exceptionally long and narrow, and the segments in most species are very much elongated. In the majority of species the male is without post-ocular spines; but these are to be found in the female, which sex, so far as may be judged, is always more sparsely set with spines both on the lateral margins of the head and on the fore-legs, and has the abdomen broader and shorter than in the male, and the tube also decidedly stouter. The strong hook-like spine at the apex of each fore-femur without, pointed out by Buffa, is apparently not a characteristic of this genus, nor common to all the species. I cannot distinguish it in any of my Neotropical material, and have only observed it in two undescribed species of *Dicaiothrips*, one from the Malay Archipelago and the other from North Africa. This character, too, is not confined to this genus; it is seen in two or three species of *Idolothrips*, whilst I have a specimen of an undescribed species belonging to a genus far removed from these last-named genera, which has these spines very strongly developed.

The type of the genus is undoubtedly *Idolothrips Schötti* (Heeger) Uzel*, described from Brazil, to which species Buffa erroneously refers my *Idolothrips foveicollis*, and at the same time ascribes a Malayan form to the same species. Both *D. Schötti* and Buffa's Malayan form have the third and fourth antennal joints subequal, which character alone at once separates

* Heeger, Sitzungsab. d. Akad. d. Wiss., Vienna, viii. p. 139, pl. 23 (1852); and Uzel, Monographie der Ordnung Thysanoptera, Königgrätz, p. 266 (1895).

them both from *D. foveicollis*, and from all the species (in which the antennæ are preserved) dealt with in this paper. I am fortunate enough to possess Heeger's original drawings of *Thrips*, and the plate "*Thrips*, L., *Physapus*, De G. Lat., *Sp. Schötti*" would make it appear that *D. Schötti* was a shining black insect, with the antennæ entirely concolorous with the body, whilst Buffa says that his species has the third antennal joint clear yellow. In any case *D. foveicollis* cannot be referred to either of these forms, nor do I feel justified in referring any of the other species that have passed through my hands to Heeger's *Schötti*. I hope that it will be possible to satisfy ourselves on the identity of Heeger's species by an examination of his type.

In the following Table the male characters (with but one exception) are adopted:—

- I. Head produced beyond the eyes for at least the length of eye, and for more than the width at the base of the produced part; post-ocular bristles present in the male; bristles at apex of ninth abdominal segment as long as the tube ♂ *nitidus*, sp. n.
- II. Head produced beyond the eyes for less than the length of eye, and for less than the width of the produced part; post-ocular bristles absent in the male (excepting in *D. Championi*); bristles at apex of ninth abdominal segment (excepting in *D. distinctus*) distinctly shorter than the tube.
 - 1. Head more strongly produced beyond eyes; bristles at apex of ninth abdominal segment shorter than the tube; eighth abdominal segment either longer than, as long as, or only slightly shorter than the seventh.
 - i. Post-ocular bristles present ♂ *Championi*, sp. n.
 - ii. Post-ocular bristles apparently absent.
 - A. Eighth abdominal segment decidedly longer than the seventh; tube shorter than the eighth segment.
 - a. Size larger (13.0 mm.); head more than three times as long as broad; lateral cephalic spines very long and irregular; tube more than seven times as long as broad at base, and nearly as long as the head. ♂ *grandis*, sp. n.
 - b. Size smaller (about 9.0 mm.); head less than three times as long as broad; lateral cephalic spines short and regular; tube less than five times as long as broad at base, and only two-thirds the length of head ♂ *propinquus*, sp. n.
 - B. Eighth abdominal segment as long as, or slightly shorter than the seventh; tube longer than either the seventh or eighth segments.
 - a. Head about two and one-half times as long as broad; third antennal segment one-half the length of head, and the three apical segments together as long as the fourth joint; prothorax foveolate; eighth abdominal segment shorter than the seventh ♂ *foveicollis* (Bagnall).

- Tube more slender, and at least as long as head ;
bristles at apex of ninth abdominal segment three-
quarters the length of tube ♀ *foveicollis* (Bagnall).
- ♂. Head more slender, about three times as long as
broad; third antennal segment less than one-half
the length of head, and the three apical segments
together one and two-thirds as long as the fourth
joint; prothorax smooth; seventh and eighth
abdominal segments subequal..... ♂ *levicollis*, sp. n.
- Tube stouter, and not so long as the head; bristles
at apex of ninth segments as long as tube..... ♀ *levicollis*, sp. n.
2. Head very slightly produced beyond the eyes; bristles at
apex of ninth abdominal segment longer, or at least as
long as the tube; eighth abdominal segment considerably
shorter than the seventh*.
- i. Head longer, two and three-quarters as long as broad;
eyes occupying laterally about one-quarter the length
of head; tube a little more than two-thirds the length
of head; bristle at each posterior angle of the prothorax
weaker and not so long ♂ *distinctus*, sp. n.
- ii. Head shorter, two and one-third times as long as broad;
eyes occupying laterally not quite one-third the length
of head; tube three-quarters the length of head;
bristles at each posterior angle of prothorax longer and
stronger ♀ *brevicornis*, sp. n.

DICAIOTHRIPS NITIDUS, sp. nov. (Pl. 51. fig. 10; Pl. 52. fig. 7.)

♂. Length 5.2 mm., breadth of mesothorax 0.75 mm.

Colour shining black, tarsi brownish.

Head cylindrical, nearly three and one-half times as long as wide at base ; narrowed behind eyes and slightly widened towards base ; vertex produced beyond eyes for about one-fifth the total length of head. Cheeks set with a few short, subequal spines, and a long lateral one behind each eye. Eyes comparatively large and finely faceted, bulging strongly, the width across them being one and one-quarter times the width of head near base ; post-ocular spines present, but not long. Ocelli large, posterior pair near to inner margins of eyes and placed above a line drawn across their anterior third, the space between the ocelli being only slightly more than the diameter of one of them ; anterior ocellus near the vertex, protected by a pair of long, strong, black bristles. Antennæ inserted at extreme apex of head, unfortunately broken ; two basal joints cylindrical and subequal in length.

Prothorax one-third the length of head, and nearly twice as broad as long ; strongly convex, shining and glabrous ; only very slightly widened to base ; fore-angles broadly rounded, depressed ; a rather deep, transverse depression before base, and a few irregular, shallow, and unimportant foveæ on each

* We do not know the male of *brevicornis*, and cannot therefore state whether these latter characteristics are applicable to that species or not.

side of median line. Spine at each posterior angle short and weak, set in slight protuberance. Outer margin of fore-coxa angular, with long, stout spine at apex of angle and two shorter ones below. Fore-femora long and stout, not quite one-quarter as broad as long; tibia not quite as long as femur, and the tarsus armed with a long, somewhat slender and acute tooth. The outer margin of the fore-femur is armed with six or seven moderately long, strong bristles, some of them being curved forwards, several shorter ones, chiefly behind a line drawn across the middle of the femur, and some slender ones near the apex, one or two of which are longer than any of the others; series on inner margin composed of short and slender setæ. Intermediate and hind-legs long and slender, femora armed with several long and comparatively stout bristles, and all tibiæ with slender hairs, a few, below each knee, being long ones. Pterothorax slightly broader than the width across fore-coxa, almost square, the dorsal surface of the mesothorax being very distinctly reticulate. Wings reaching to the sixth abdominal segment.

Abdomen about two-thirds the total length of insect, long and slender; none of the body-segments, however, being more than one and one-half times the length of breadth. Ninth segment short, one-third the length of the preceding. Tube four times the length of ninth segment, and two-thirds the length of the head; terminal hairs about as long as tube, weak. Bristles on ninth segment longer than tube, rather stout, the other abdominal hairs being short and weak.

Habitat. Brazil; Montagnes des Orgues, Rio de Janeiro. In the environs of Tuuca at an altitude of from 600 to 1000 metres (*E. R. Wagner*, 1901).

Type. One male in Paris Museum.

Apart from its shining black colour *D. nitidus* may be easily recognized by the strongly produced head and by the long hairs on the ninth abdominal segment which overreach the tip of the tube. The depressed fore-margin of the prothorax is, I believe, a valuable character, and it will be noticed that the post-ocular bristles are present. The tube is decidedly longer than either the seventh or eighth abdominal segment.

DICAIOTHRIPS GRANDIS, sp. nov. (Pl. 51. fig. 4; Pl. 52. fig. 4.)

♂. Length 13 mm.

General colour black, tibiæ and tarsi brownish.

Head cylindrical, nearly three and one-half times as long as wide, narrowed behind eyes and slightly widened before constriction at base; vertex produced beyond eyes for a little more than one-seventh the total length of head. Cheeks set with a few long spines and several shorter ones. Eyes moderately large and finely faceted, bulging; post-ocular spines absent. Ocelli large, posterior pair near to inner margins of eyes and just above the mid-line; anterior ocellus near vertex and protected by a pair of long bristles. Antennæ inserted at extreme apex of head, separated at base; long and

slender, evidently considerably longer than the head, but unfortunately broken in the type-specimen, only five joints remaining intact. First and second joints short and cylindrical, black; third, fourth, and fifth joints yellowish brown, and shining black at tips. Third more than three times the length of the two basal joints together; fourth one-half the length of third, and fifth four-fifths the length of fourth. Sense-cones moderately long and acute.

Prothorax one-third the length of the head, and about one-third broader than long; irregularly foveolate, with distinct humeral depressions, a deep, transverse depression before base, and with somewhat shallow and irregular foveæ at each side of central channel. A spine-set tubercle at each posterior angle, a pair of short posterior-marginal spines, and minute spines at each anterior angle. Each fore-coxa set with one long, conspicuous spine and several shorter ones. Fore-femora much enlarged, with dorsal surface depressed; inner margin armed with a series of moderately long and strong bristles, and the outer margin with several much longer bristles interspersed with short ones. Fore-tibia short and broad, and fore-tarsus armed with a long, strong tooth. Intermediate and hind tibiæ slender, and the hind pair exceptionally long. Wings reaching to fifth abdominal segment, cilia closely set but not heavy.

Abdomen more than three-quarters the length of the whole insect, extremely long and slender, canaliculate, exceedingly sparsely clothed with minute white setæ. Segments 5 to 8 each between four and five times as long as broad; ninth segment short, only one-fifth the length of the preceding. Tube narrow, four times the length of ninth segment, but not quite so long as the head. Terminal hairs short and weak, not one-half the length of the tube. Bristles at apex of the ninth segment and at the basal third (or thereabouts) of the preceding segments moderately long, but weak.

Habitat. Cerro Zunil, 4000-5000 feet (*Champion*).

Type. In coll. Godman and Salvin, one ♂.

Dicaiothrips grandis may be separated from *D. foveicollis* (Bagnall) by its much larger size, the longer head as compared to its breadth, the very long lateral cephalic bristles, the less glossy surface of head and fore-femora, the much elongated eighth abdominal segment, and by the shorter and less strong bristles on the ninth abdominal segment. In *foveicollis*, moreover, the third antennal joint is less than twice the length of the fourth. These comparative remarks also apply, for the most part, to *D. Championi* and *D. lavicollis*, whilst the species is directly separated from *propinquus* in the table.

D. grandis is the largest known species of *Dicaiothrips* and a giant of the order.

DICAIOTHRIPS FOVEICOLLIS (*Bagnall*). (Pl. 51. figs. 1 & 2 ; Pl. 52. figs. 1 & 2.)

Idolothrips foveicollis, Bagnall, Trans. Nat. Hist. Soc. of Northumberland, Durham, and Newcastle-upon-Tyne, n. s. iii. p. 214, pl. 7. fig. 12 (1908).

I have already stated that this is a compound species as regards the male, the second species being herein separated under the name of *Championi*.

♂. The true *foveicollis* has the eighth abdominal segment distinctly shorter than the seventh, and the tube, which is slenderer than in *Championi*, is considerably longer than either the seventh or eighth segment. The post-ocular spines are apparently absent. This species bears a somewhat strong resemblance to *D. lævicollis*, but is at once recognized by the characters given in the table.

Type. Male and females in coll. Godman and Salvin.

Habitat. One male and three females collected by Mr. Champion at Cerro Zunil, 4000–5000 feet ; and a single female, Teapa, Tabasco (March, *H. H. Smith*).

DICAIOTHRIPS CHAMPIONI, sp. nov. (Pl. 51. fig. 3 ; Pl. 52. fig. 3.)

D. foveicollis in part.

♂. Length 10·5 mm., breadth of mesothorax 0·8 mm.

Closely allied to *D. foveicollis*, slightly larger, with the abdomen longer but less slender, the prothorax less strongly foveolate, and the fore-legs slightly stronger. Post-ocular bristles (absent in the male of *foveicollis*) present. The seventh and eighth abdominal segments are considerably longer than in *foveicollis* and practically subequal, the eighth being but slightly shorter than the seventh, whilst the tube is the same length as the seventh body-segment.

Type. One male in coll. Godman and Salvin.

Habitat. Cerro Zunil, 4000–5000 feet (*Champion*).

DICAIOTHRIPS LÆVICOLLIS, sp. nov. (Pl. 51. figs. 5 & 6 ; Pl. 52. figs. 5, a, b, & 6.)

♂. Length 7·5 mm., breadth of mesothorax 0·7 mm.

Colour dark chestnut-brown ; fore-tibiæ and all tarsi yellowish brown ; third and fourth antennal segments yellow, tipped with brown, basal half of fifth and base of sixth also yellow.

Head cylindrical, almost three times as long as wide near base, narrowed behind eyes and very slightly widened before constriction at base ; vertex produced beyond eyes for about one-ninth the total length of head. Cheeks set somewhat closely with short spines. Eyes bulging, moderately large and finely faceted ; post-ocular spines absent ; ante-ocular spines (protecting anterior ocellus) very long. Ocelli rather large, placed as in *D. foveicollis* (*Bagnall*), but the space between the eyes, and consequently between the

posterior pair of ocelli, greater than in that species. Antennæ inserted at extreme apex of head and separated at base, long and slender; one and one-half times the length of head; joints 3 to 5 mildly claviform, 6 to 8 fusiform. Basal joint short; third more than four times the length of second; fourth about five-eighths of third; fifth four-fifths of fourth; sixth three-quarters of fifth; seventh two-thirds of sixth; and apical joint much narrower, but very slightly shorter, than the penultimate. Pair of sense-cones on both third and fourth joints moderately long and acute, pair on fifth and a single one on the outer side of sixth joint very short and blunt. Mouth-cone rounded at tip and not reaching halfway across prosternum. Maxillary palpi comparatively short, apical joint about three times the length of basal, narrower and furnished with three sensory filaments, which are shorter and stouter than is usual; labial palpi short and stout, with three very short sensory filaments at tip.

Prothorax one-half the length of head and very slightly wider at base than long; transverse depression before base; surface smooth, but not shining; the fovea on each side are obsolete, and the sides of prothorax gradually rounded from anterior margin to middle. Spine at each posterior angle short and weak, and inner posterior-marginal pair slightly shorter and more slender; other prothoracic spines apparently obsolete. One long, strong bristle on each fore-coxa and several shorter ones. Fore-femur enlarged, broadest through basal third, where it is less than one-half as broad as long; series of spines on inner edge, and several larger ones on the outer edge interspersed with short ones, some of these latter being stouter than the others; tibia broad, and tarsus armed with a somewhat acute tooth. Pterothorax broader than the width across fore-coxæ, almost square; the sides of metathorax gently arcuate and narrowed to base of abdomen. Wings reaching to fourth abdominal segment, cilia shortest at ends. Intermediate and hind legs long; femora with a few short spines, and the tibiæ furnished for the entire length with several regular rows of short white hairs.

Abdomen about three-fifths the total length of body, having all segments elongated; eighth segment twice as long as broad, and ninth only a little more than one-half the length of eighth. Tube long and slender, evenly narrowed from base to tip; about twice as wide at base as at apex; two and one-quarter times the length of the preceding segment, and five-sixths the length of head. Terminal hairs short and weak, bristles at apex of ninth segment only about four-fifths the length of tube, and other abdominal bristles colourless and comparatively short and weak.

♀. The female has the cheek more sparsely set with setæ; the post-ocular spines are present. The abdomen is broader as in *foveicollis* female, the tube is stouter, whilst the bristles at apex of the ninth segment are as long as the tube.

Habitat. One male and one female, Los Tejes, Venezuela, September 20th, 1891 (*Meinert*).

Type. In the Copenhagen Museum.

This species most closely resembles *D. foveicollis*; both sexes may be readily recognized by the characters given in the table.

DICAIOTHRIPS PROPINQUUS, sp. nov. (Pl. 51. fig. 7; Pl. 52. fig. 9.)

♂. Length a little more than 9 mm., breadth of mesothorax 0.85 mm.

Colour dark chestnut-brown, all tibiæ and tarsi reddish yellow; antennæ as in *D. levicollis*.

Head not quite three times as long as wide near base, narrowed behind eyes and from thence parallel to base; vertex slightly raised and produced beyond eyes for one-seventh the total length of head. Cheeks set with several moderately long spines, a few of which are slightly longer and more conspicuous than the others, and a lateral one behind each eye the longest and, unlike the others, forwardly curved. Eyes bulging, moderately large and finely faceted; post-ocular spines absent. Ocelli rather large and the ante-ocular spines very long. Antennæ long and slender, inserted at extreme apex of head and separated at base; almost one and three-quarter times the length of head; joints 3 to 5 mildly claviform, 6 to 8 fusiform. Third joint nearly four times the length of second, stalk comparatively stout; fourth five-eighths of third; fifth four-fifths of fourth; sixth three-quarters of fifth; apical joint almost as long as penultimate but more slender, and both together slightly longer than the sixth. A pair of moderately long sense-cones on segments 3 to 5, and apparently only a single one on the outer side of segment 6. Mouth-cone rounded at tip and reaching halfway across prosternum; maxillary palpi moderately long, sensory filaments stout.

Prothorax one-half the length of head, somewhat convex; transverse channel near hind margin wide and very shallow, almost obsolete; surface smooth and slightly shining; fovea on each side of the median line obsolete. Spine at each posterior angle long and stout; inner posterior-marginal pair short and weak, and other prothoracic spines obsolete. Fore-coxa with one very long and strong spine and several shorter ones; fore-femur strongly incrassate, broadest through basal third, where it is a little less than one-half as broad as long; several short spines about the basal margin within, and a regular series for the entire length of the inner margin; many long ones on the outer edge, one in the centre being longer than any of the others, a few shorter but stronger ones near base without and numerous short ones for the entire length of the outer edge, being much weaker apically than nearer the base of the femur. Fore-tibia broad and depressed, hairs on the inner and outer edges set in minute warts, and one long bristle below knee. Fore-tarsal tooth long and stout. Pterothorax almost square, broader than the width across fore-coxæ. Hind and intermediate legs long and slender, femora with several stout spines, a subapical series of longer ones and a very long one at the apical

third without; tibiæ furnished from knee to tip with rows of moderately long white hairs, and a single long bristle below each knee.

Abdomen more than three-quarters the length of the whole insect, all segments elongate and gradually tapering from the base to tube. Eighth segment three times as long as broad, and ninth about one-third the length of eighth. Dorsal surface sparsely furnished with minute white setæ. Tube gently narrowed from base to near apex; not quite five times as long as broad at base, and only very slightly broader at base than at extreme apex; not quite two and one-half times the length of the preceding segment and about two-thirds the length of the head. Terminal hairs rather long and tapering, three-quarters the length of tube. Bristles on the ninth segment stronger and about as long as tube; other abdominal bristles colourless and moderately strong.

Habitat. One male, Los Trincheras, Venezuela, December 11th, 1891 (*Meinert*).

Type. In the Copenhagen Museum.

D. propinquus is distinct on account of the very long eighth abdominal segment and the comparatively short tube.

DICAIOTHRIPS DISTINCTUS, sp. nov. (Pl. 51. fig. 8; Pl. 52. fig. 10.)

Length 6·0 mm., breadth of mesothorax 0·7 mm.

Colour black, intermediate and hind-tibiæ dark chestnut-brown; tarsi yellowish to brown, fore-tibiæ and tarsi reddish yellow, with inner and outer margins of tibia shaded with dark brown.

Head two and three-quarters as long as wide near base and a little more than twice the length of prothorax; almost imperceptibly narrowed behind eyes and from thence, with the exception of a slight constriction near base, parallel-sided; vertex raised and just overreaching the insertion of antennæ, produced beyond eyes for only about one-tenth of the total length of head. Cheeks sparsely set with short spines. Eyes moderately large and finely faceted and not bulging strongly, occupying laterally about one-quarter the total length; post-ocular bristles absent. Ocelli moderately large, placed as in *levicollis*, but having the anterior one nearer to the posterior pair, the space between the latter being about three times the diameter of the ocellus. Ante-ocular bristles very long. Antennæ inserted just below vertex, basal joints separated; second joint longer than the first, brown; rest of antennæ unfortunately broken in the single specimen.

Prothorax one and one-half times as wide through middle as long; anterior margin emarginate, sides rounded; bristles at each posterior angle moderately long and prominent; roundly raised to posterior third, with the disc flat and a distinct and somewhat deep fovea on each side of the mid-line on a line drawn through the posterior third. Anterior femur twice as long as broad,

hairs on tibiæ strong and fore-tarsal tooth well developed ; intermediate and posterior legs slender, with the femora slightly swollen at their distal thirds. Pterothorax wider than the width across fore-coxæ, with sides of metathorax roundly narrowed to base of abdomen. Wings reaching to the fifth abdominal segment, hyaline, with median veins and ciliæ brown.

Abdomen gradually narrowing to tube, long and slender, with the segments elongate ; seventh segment nearly twice as long as the eighth. Tube short and broad, scarcely four times as long as broad near base, a little more than two-thirds the length of head and slightly shorter than the seventh segment ; terminal hairs not quite so long as the tube. Abdominal bristles long and moderately slender, those on the ninth segment longer than tube and reaching to the tip.

Type. One male in coll. Godman and Salvin.

Habitat. Chontales, Nicaragua (*Janson*).

D. distinctus may be easily recognized by the form of the head, which is less produced beyond the eyes than in any of the other species, excepting *brevicornis*, and by the shortness of the eighth abdominal segment and of the tube.

The characters given in the table readily separate *distinctus* and *brevicornis*.

DICAIOTHRIPS BREVICORNIS, sp. nov. (Pl. 51. fig. 9 ; Pl. 52. fig. 8.)

♀. Length 5.0 mm., breadth of mesothorax 0.62 mm.

Colour dark chestnut-brown ; fore-tibiæ and all tarsi reddish brown ; second and base of sixth antennal joints tinged with yellow, 2 to 5 yellow, third slightly tipped, and the apical third of fourth and half of fifth shaded with brown.

Head two and one-third times as long as broad, and two and one-quarter times as long as the prothorax ; shaped as in *D. distinctus*, with the vertex raised and only slightly produced beyond the eyes. Cheeks sparsely set with short spines. Eyes large and finely faceted, occupying laterally a little less than one-third the total length of the head. Ocelli moderately large, posterior pair above a line drawn through centre of eyes ; post-ocular bristles long. Antennæ one and two-thirds the length of head ; fourth joint three-quarters of third, fifth five-sixths of fourth ; joints 3 to 5 claviform and 6 to 8 fusiform. A pair of sense-cones on each of the joints 3 to 5, but apparently only a single cone on the inner side of joint 6. Mouth-cone blunt, and reaching more than halfway across prosternum.

Prothorax with the bristle at each posterior angle long and strong. Pterothorax only slightly broader than long ; sides of metathorax slightly rounded and furnished with a strong sub-lateral spine near each posterior angle. Legs moderately long ; fore-femur slightly incrassate, with a few long bristles on

outer edge ; fore-tarsal tooth obsolete ; fore-coxa with one prominent spine. Hind and intermediate femora with bristles as in *D. propinquus*, but decidedly weaker ; each intermediate tibia with two bristles, and hind tibia with one bristle below the knee. Wings present, reaching to the fifth abdominal segment ; iridescent ; median vein running almost to middle.

Abdomen gradually narrowing to tube from the fifth segment ; ninth segment apparently possessing a pair of elongate dorsal foveæ, which are, however, indistinct and very difficult to make out. Tube stout, three-quarters the length of the head, and about twice and one-half as long as broad at base. Bristles at apex of the ninth segment longer than the tube ; other abdominal bristles light-coloured, with one very long pair on each of the segments 3 to 7.

Type. In the Copenhagen Museum.

Habitat. Two females, Los Trincheras, Venezuela, one on the 11th and the other on the 12th of December, 1891, and one female, Caracas, Venezuela, October 6th, 1891 (*Meinert*).

From the shortly produced head it will be seen that this species is closely allied to *D. distinctus*. The head is, however, much shorter, the eyes are comparatively larger, whilst the tube, in proportion to the head, is longer.

Genus IDOLOTHRIPS, *Haliday*.

Elaphrothrips, Buffa, 'Redia,' v. fasc. 2, p. 162 (March 1st, 1909).

I have already pointed out my reasons for regarding the species (*I. marginata*, Hal.) of Haliday's first division of his genus *Idolothrips* as the generic type, and at the same time erected the genus *Acanthinothrips* for the species of his second division, *spectrum* and *lacertina*. Despite these reasons, Prof. Buffa, apparently following Froggatt in regarding Haliday's three species as one, making *Idolothrips spectrum* the type of that genus, has erected for most of the species that were previously referred to the genus *Idolothrips*, a new genus, *Elaphrothrips*. As stated, Froggatt does not, in my opinion, give sufficient data in support of his views, and in these circumstances we must sink Buffa's genus *Elaphrothrips* as a synonym of *Idolothrips*, and retain the genus *Acanthinothrips*, Bagnall, for Haliday's *I. spectrum*. To do otherwise would, I consider, cause unnecessary confusion.

IDOLOTHRIPS ANGUSTATUS, sp. nov. (Pl. 51. fig. 11 ; Pl. 52. fig. 11.)

♂. Length about 4.65 mm., breadth of mesothorax 0.55 mm.

General colour brown ; tarsi yellowish brown ; antennal joints 3 and 4 yellow, shaded with brown at apices, and basal half of sixth joint also yellow.

Head long, cylindrical ; more than two and one-half times as long as broad at basal third, and a little more than twice the length of the prothorax. Cheeks set with a few short stout spines, a lateral spine behind each eye being longer than the others ; head only very slightly broadened towards basal third ; vertex produced into a conical hump in front of eyes, reaching to the insertion of antennæ. Eyes moderately large, finely faceted, and distinctly bulging ; post-ocular spines absent ; ante-ocular spines exceptionally long, overreaching the apex of the second antennal joint. Ocelli large, placed as in *I. longiceps*. Antennæ narrowly separated at base, about one-half as long again as the head ; first joint cylindrical ; second longer than first and slightly constricted at base ; third to fifth claviform, and sixth to eighth fusiform. Third joint nearly three times the length of the second ; fourth three-quarters of third ; fifth five-sixths of fourth ; sixth three-quarters of fifth ; and seventh about three-quarters of preceding and half as long again as the apical joint. The three apical joints are covered with numerous short sense-hairs. Sense-cones moderately long, acute, and apparently only one on the sixth joint. Mouth-cone rounded, scarcely reaching more than one-third way across prosternum.

Prothorax one and three-eighths as broad (excluding fore-coxæ) as long, widened gradually from anterior margin to middle, the sides being gently arcuate, and as wide across base as through middle. Spine at each hind-angle and the inner posterior marginal pair moderately long and stout ; mid-lateral and anterior marginal spines obsolete, and spine at each fore-angle very short, but stout. Fore-coxa projecting considerably, armed with one long, conspicuous spine, and two or three short ones behind. Fore-femur moderately broad, broadest at basal third, where it is two-fifths as broad as long ; armed with several short spines, five or six longer and stouter ones on the outer margin of basal third, and two or three long ones near middle. Fore-tibia and tarsus together equal the length of femur ; tibia rather broad, and the tarsus long, and armed with a moderately long and stout tooth near base. Intermediate and posterior legs long ; a few long and strong spines on femora, and short ones at tip of each tibia, protecting the tarsus. Pterothorax slightly wider than the width across the fore-coxæ, almost square ; sides of metathorax gently arcuate, and narrowing to base of abdomen. A pair of rather long bristles at the outer edge of each of the meso-metathoracic stigmata, and a longer one on each lateral margin of the metathorax. Wings reaching to the fifth abdominal segment, and no segments furnished with wing-retaining spines beyond the fifth one ; wings rather lightly fringed, and median vein extending for more than half the length.

Abdomen long and very slender, gradually narrowing from the base to tube ; slightly more than two-thirds the total length of insect. Tube about three-fifths the length of the preceding segment and two-thirds the length

of head; three times as broad at base as at apex, and evenly narrowing from base to tip. Terminal hairs not quite the length of tube; those on the ninth segment long and stout, being longer than the tube, and the other abdominal bristles rather short and weak.

Habitat. One male, Los Trincheras, Venezuela, December 11th, 1891 (*Meinert*).

Type. In the Copenhagen Museum.

I. angustatus most closely approaches *I. longiceps*, Bagnall, and may be separated by the colour, the shorter head, the absence of post-ocular spines, the very short spine at each anterior prothoracic angle, the strongly projecting fore-coxæ, the fewer and decidedly less strong spines on the fore-femora, the longer and even more slender body, and by the shorter and stouter tube.

IDOLOTHRIPS LONGICEPS, *Bagnall*.

Idolothrips longiceps, Bagnall, Trans. Nat. Hist. Soc. of Northumberland, Durham, and Newcastle-on-Tyne, n. s. iii. p. 211, pl. 7. fig. 10 (1908).

Elaphrothrips longiceps, Buffa, 'Redia,' v. fasc. 2, p. 164 (1909).

Buffa records this species from Mexico, and there is a second specimen in the Godman and Salvin collection from Chontales, Nicaragua.

Genus LIOTHRIPS, *Uzel*.

LIOTHRIPS ELONGATUS, sp. nov. (Pl. 53. figs. 1-3.)

♀. Length 3.3 mm., breadth of mesothorax at base 0.5 mm.

Colour black, tips of tibiæ and all tarsi brownish; antennæ with the third joint clear yellow.

Head with the anterior margin slightly rounded, narrowed anteriorly, narrowest at base and widest across eyes; twice as long as the prothorax and slightly more than twice as long as wide at base. Cheeks straight, set with a few minute and inconspicuous setæ. Eyes large and rather finely faceted; space between them equal to the width of one of them; post-ocular spines long, longer than the length of eye. Ocelli large; posterior pair set above a line through centre of eyes and close to their margins, anterior one set on the extreme vertex; ante-ocular spines long (two-thirds the length of eye) and stout. Antennæ separated at base, inserted under the vertex and one and one-half times the length of head; first joint cylindrical, second elongate and constricted at base, 3 to 5 claviform, and 6 to 8 fusiform; relative lengths of joints practically the same as in *D. armatus*.

Prothorax not twice as wide at base (excluding the fore-coxæ) as long, widened from anterior margin for one-half the length, and from thence parallel to base. Spines at posterior angles very long, inner posterior-marginal pair short, and the mid-lateral and the anterior-marginal pairs apparently

obsolete. Chief spine on fore-coxa short and inconspicuous. Fore-femur not strongly thickened, three times as long as the breadth through the centre, where it is widest; tibia very slightly longer than the femur; tarsus unarmed. Intermediate and hind-legs long and slender, with coxæ projecting. Pterothorax wider than the prothorax and broadest at the juncture of the meso- and metathorax, sides of the metathorax gently arcuate and narrowing to base of abdomen. Wings reaching to the fifth abdominal segment.

Abdomen narrower than the pterothorax, sides parallel to the fifth segment and from thence very gradually narrowed to tube. Segments not strongly transverse, each being long and very slightly wider than the length, with the exception of the eighth segment, which is slightly longer than broad. Tube very short, only slightly longer than the preceding segment and two-fifths the length of the head; twice as broad at base as at apex and evenly narrowed from base to tip. Terminal hairs about the length of tube, weak. Abdominal hairs long, those at the hind margin of the ninth segment being nearly twice the length of the tube.

Habitat. One female, Los Adjuntas, Venezuela, September 10th, 1891 (*Meinert*).

Type. In the Copenhagen Museum.

L. elongatus may be easily recognized by the form of the body-segments, the long head, and the short and broad tube.

LIOTHRIPS SIMILIS, sp. nov. (Pl. 53. figs. 4-7.)

♀. Length 3.5 mm.; breadth of mesothorax 0.55 mm.

Colour dark chestnut-brown, almost black, all tarsi brownish; antennæ dark brown, second joint lighter and third joint clear yellow; tip of tube shaded to brown.

Head one and three-quarters times as long as broad behind eyes and as the length of prothorax, slightly widened anteriorly, and vertex broadly produced in the form of a depressed hump; cheeks set with a few minute and inconspicuous setæ, roundly and rather sharply constricted at base. Eyes small and moderately finely faceted, less than one-quarter the length of head. Post-ocular spines long and ante-ocular spines apparently obsolete. Ocelli rather large and the posterior pair on a line drawn through the anterior third of eyes. Antennæ inserted under vertex, approximate at base, and more than half as long again as the head; third and fourth joints mildly claviform, fifth to eighth fusiform; third joint three times the length of second; fourth five-sixths of third; fifth, sixth, and seventh four-fifths of the fourth, fifth, and sixth respectively; penultimate joint somewhat broadened, and the apical one rounded at tip. Sense-cones slender, and the two apical joints furnished with numerous sense-hairs. Mouth-cone nearly reaching to base of prosternum; maxillary palpi long and rather stout.

Prothorax five-eighths the length of head ; spines at posterior angles longest ; posterior-marginal pair shorter, and those at the anterior angles and the mid-lateral and anterior-marginal pairs shorter again, but moderately stout. Fore-coxa with one somewhat conspicuous spine. Fore-femur two and one-quarter times as long as broad, without any conspicuous spines and furnished with a long hair near base within ; tibia slightly longer than the femur ; tarsus unarmed. Intermediate and hind-legs long and slender, with a short spine at tip within, with a moderately long hair at tip on the outer side of each tibia. Pterothorax a little broader than the width across fore-coxæ ; mesothorax wider than the metathorax and with the sides parallel. Wings reaching to the seventh abdominal segment.

Abdomen about as wide as the mesothorax, sides parallel to the seventh segment ; eighth segment broadest at fore-part and gently narrowed to hind-margin, and ninth segment narrowed to base of tube. Tube three times as long as the breadth at base, twice the length of the preceding segment and about three-quarters the length of the head. Terminal hairs not quite so long as tube, weak. Abdominal bristles long, those of the ninth segment being longer than tube.

Habitat. One female, Los Adjuntas, Venezuela, September 10th, 1891 ; and one female, Dos Caminos, June 14th, 1891 (*Meinert*).

Type. In the Copenhagen Museum.

The long tube and the apparent absence of the ante-ocular bristles readily distinguish this form.

LIOTHRIPS INTERMEDIUS, sp. nov. (Pl. 53. figs. 8–11.)

♀. Length 3·5 mm., breadth of mesothorax 0·55 mm.

This species closely resembles both *L. elongatus* and *L. similis*. Like *L. elongatus* it possesses a very short tube, which is only one-half as broad at base as long and a little more than two-fifths the length of the head. The insect is broader, however, than *elongatus* ; the antennæ are shorter as compared with the length of the head ; the fore-legs are stouter and slightly shorter, and the femur furnished with a few rather conspicuous bristles on the outer edge ; the abdomen is broader than the prothorax, whilst the eighth abdominal segment is decidedly shorter than the seventh and not longer as in *elongatus*.

It perhaps resembles *similis* more closely than *elongatus* ; the head in *similis*, however, is slightly more slender and the rest of the body comparatively broader. *L. intermedius* possesses prominent ante-ocular bristles, also bristles on the outer edge of the fore-femur, and a pair of dorsal bristles on the seventh abdominal segment which we cannot distinguish in *similis* ; whilst the tube in the last-named insect is more slender and half as long again as in *intermedius*, being three times as long as the breadth at base and three-quarters the length of head.

Habitat. Two females, Los Adjuntas, Venezuela, September 10th, 1891 (Meinert).

Type. In the Copenhagen Museum.

Genus DICERATOTHRIPS, *Bagnall*, 1908.

DICERATOTHRIPS ARMATUS, sp. nov. (Pl. 53. figs. 12-16.)

♀. Length 5.0 mm., width of mesothorax 0.65 mm.

Colour brownish black.

Head nearly one-half as long again as the width at base and about one-third longer than the prothorax; widened anteriorly, being widest behind eyes. Frons truncate; cheeks set with a few moderately stout spines. Eyes small and moderately finely faceted; post-ocular spines long. Ocelli large, posterior pair set on a line with the centre of eyes and close to their margins, and the anterior ocellus set in centre of forehead and protected by a pair of forwardly-directed spines, which are rather long and set close to the margins of eyes in front. Antennæ separated at base, inserted under vertex, and about twice the length of the head; first joint cylindrical, concealed at base; second elongate and slightly constricted at basal joints; 3 to 5 claviform and 6 to 8 fusiform. Third joint three times the length of the second; fourth two-thirds of third; fifth, sixth, and seventh four-fifths of the fourth, fifth, and sixth respectively; and the apical joint five-eighths the length of the penultimate. Sense-cones moderately long and acute, light-coloured, and a series of sense-hairs from tip to base of apical joint and continued down the apical third of the penultimate joint. Mouth-cone long and somewhat sharp, almost reaching to the base of the prosternum.

Prothorax not quite twice as broad across fore-coxæ as long, smoothly widened from anterior margin to basal third. Spines at each hind-angle very long; posterior-marginal spines short but stout; anterior-marginal pair and those at each anterior angle short and set well back, and the mid-lateral pair apparently absent. Pterothorax almost square, widest before the juncture of the meta- and mesothorax. Fore-coxa with one conspicuous spine; fore-femur twice as long as broad, set with a few strong, short spines near the base without and about the middle within, and two long bristles on the outer margin, one on the mid-line and the other before apex. Fore-tibia rather long and stout and the tarsus armed with a small tooth. Intermediate and posterior femora armed with several short but strong spines, and tibiæ set with similar spines at apices and with one or two long hairs. Wings long and broad, smoky yellow.

Abdomen almost as broad as the pterothorax, gradually narrowed to tube from the sixth segment. Tube about one-eighth longer than head, tapering

gradually, and only twice as broad at base as at apex; terminal hairs weak and less than one-half the length of tube. Bristles at apex of ninth segment longer than tube; extreme lateral pair on eighth segment as long again as the inner ones, and two pairs on seventh segment and a single pair on segments 5 and 6 very long.

♂. The male has the fore-femur strongly incrassate and swollen, whilst the strong spines about the middle within take the form of strong tooth-like protuberances; the fore-tibia has the short spines on the inner edge stronger and set in warts, whilst the fore-tarsal tooth is very long and acute. The body is also more slender than in the female.

Habitat. Six specimens (two males and four females) and larvæ collected by Dr. Meinert at La Moka, Venezuela, March 1891.

Types. In the Copenhagen Museum.

D. armatus may be easily recognised by its size and by the strongly characterised fore-legs in both sexes.

Penshaw Lodge, Penshaw,
December 1st, 1909.

EXPLANATION OF THE PLATES.

PLATE 51.

- | | | | |
|---------|---|--|-------|
| Fig. 1. | <i>Dicaiothrips foveicollis</i> (Bagnall), ♂. | Head, prothorax, and right antenna and fore-leg. | × 14. |
| 2. | " " " ♀. | Part of head, prothorax, and right fore-leg. | × 14. |
| 3. | " <i>Championi</i> , sp. nov., ♂. | Head, prothorax, and right fore-leg. | × 14. |
| 4. | " <i>grandis</i> , sp. nov., ♂. | Do. do. do. | × 14. |
| 5. | " <i>levicollis</i> , sp. nov., ♂. | Head, prothorax, and right antenna and fore-leg. | × 14. |
| 6. | " " ♀. | Part of head, prothorax, and right fore-leg. | × 14. |
| 7. | " <i>propinquus</i> , sp. nov., ♂. | Head, prothorax, and right antenna and fore-leg. | × 14. |
| 8. | " <i>distinctus</i> , sp. nov., ♂. | Head, prothorax, and right fore-leg. | × 14. |
| 9. | " <i>brevicornis</i> , sp. nov., ♀. | Head, prothorax, and right antenna and fore-leg. | × 14. |
| 10. | " <i>nitidus</i> , sp. nov., ♂. | Head, prothorax, and right fore-leg. | × 14. |
| 11. | <i>Idolothrips angustatus</i> , sp. nov., ♂. | Head, prothorax, and right antenna and fore-leg. | × 14. |
| 12. | " <i>longiceps</i> , Bagnall, ♂. | Do. do. do. | × 14. |

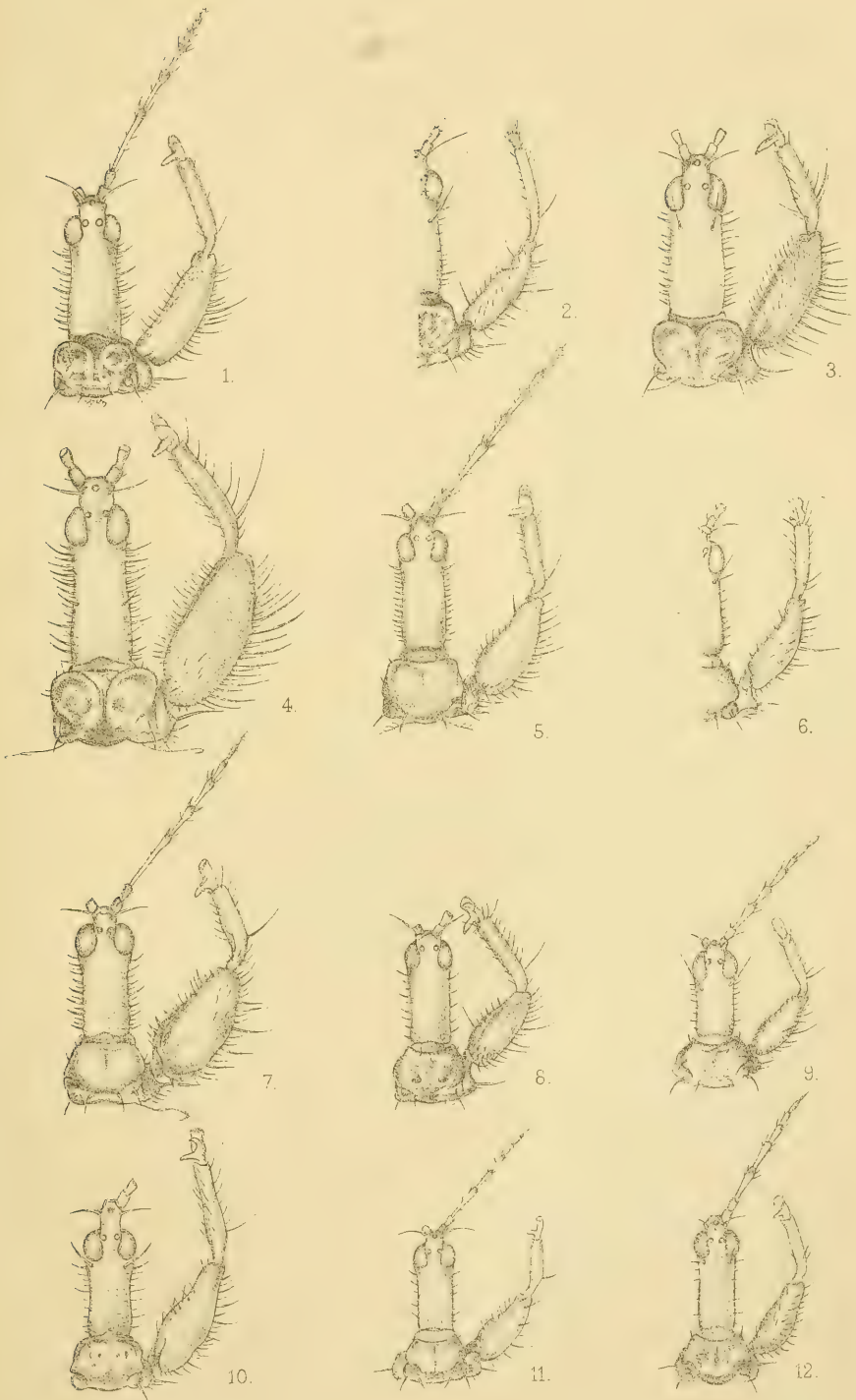
PLATE 52.

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|---------|---|-----------------|-------|
| Fig. 1. | <i>Dicaiothrips foveicollis</i> (Bagnall), ♂. | End of abdomen. | × 14. |
| 2. | " " " ♀. | Do. do. | × 14. |

- Fig. 3. *Dicaiothrips Championi*, sp. nov., ♂. End of abdomen. × 14.
 4. ,, *grandis*, sp. nov., ♂. Do. do. × 14.
 5. ,, *levicollis*, sp. nov., ♂. Do. do. × 14.
 5 a. ,, ,, ♂. Ventral view of ninth abdominal segment :
t, tergite ; *s*, sternite ; *x, y*, basal plate and
 bladder in the male organ. × 28.
 5 b. ,, ,, ♂. Do. do. do. × 60.
 6. ,, ,, ♀. End of abdomen. × 14.
 7. ,, *nitidus*, sp. nov., ♂. Do. do. × 14.
 8. ,, *brevicornis*, sp. nov., ♀. Do. do. × 14.
 9. ,, *propinquus*, sp. nov., ♂. Do. do. × 14.
 10. ,, *distinctus*, sp. nov., ♂. Do. do. × 14.
 11. *Idolothrips angustatus*, sp. nov., ♂. Do. do. × 38.
 12. ,, *longiceps*, Bagnall, ♂. Do. do. × 38.

PLATE 53.

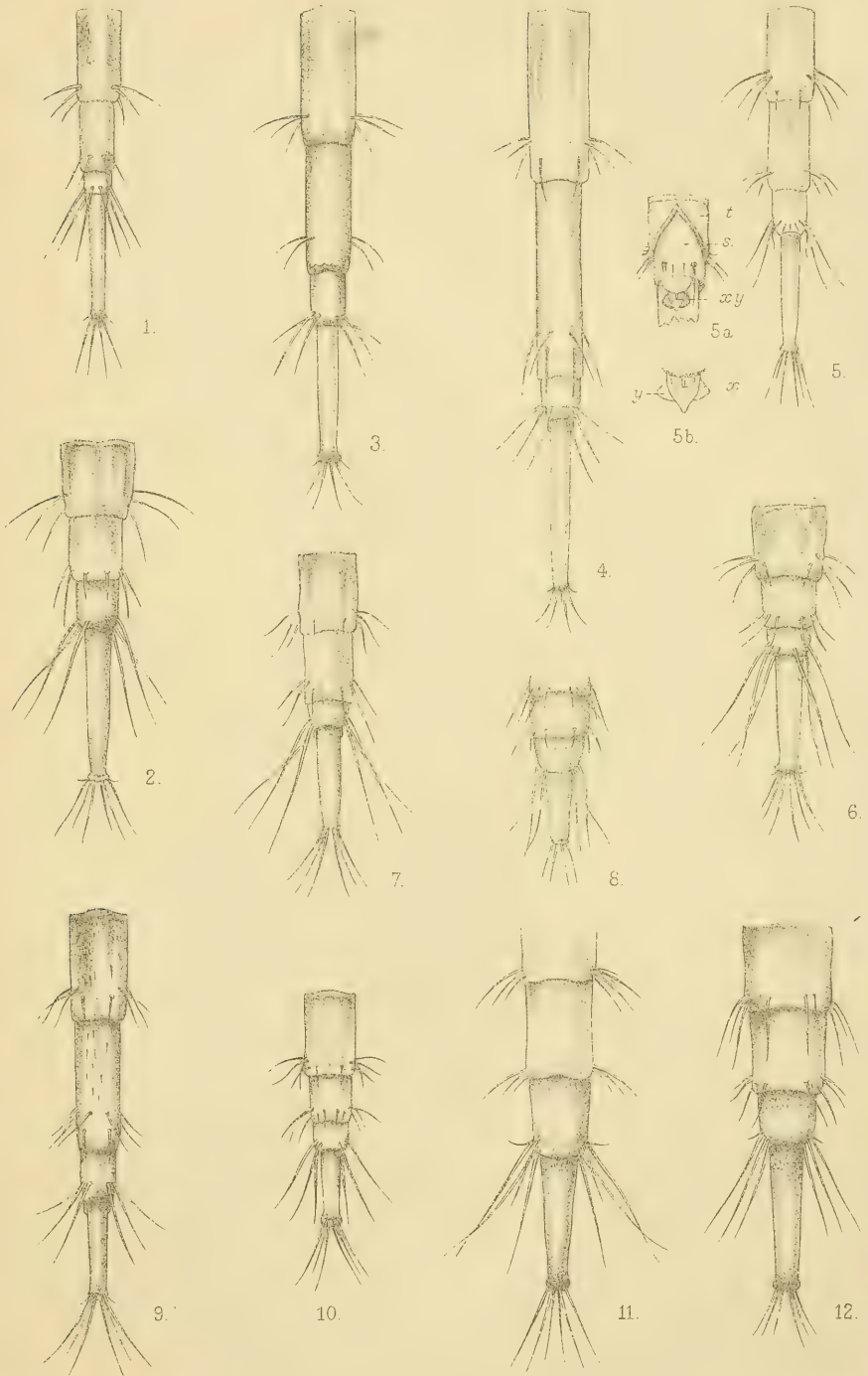
- Fig. 1. *Liothrips elongatus*, sp. nov., ♀. Head, prothorax, and right antenna and fore-leg.
 × 38.
 2. ,, ,, End of abdomen. × 38.
 3. ,, ,, Posterior leg. × 19.
 4. ,, *similis*, sp. nov., ♀. Head, prothorax, and right antenna and fore-leg.
 × 38.
 5. ,, ,, End of abdomen. × 38.
 6. ,, ,, Posterior leg. × 19.
 7. ,, ,, Intermediate tarsus. × 60.
 8. ,, *intermedius*, sp. nov., ♀. Head, prothorax, and right antenna and fore-leg.
 × 38.
 9. ,, ,, End of abdomen. × 38.
 10. ,, ,, Posterior leg. × 19.
 11. ,, ,, Maxillary palpus. × 60.
 12. *Diceratothrips armatus*, sp. nov., ♀. Head, prothorax, and right antenna and fore-
 leg. × 38.
 13. ,, ,, End of abdomen. × 38.
 14. ,, ,, ♂. Fore-femur, tibia, and tarsus. × 19.
 15. ,, ,, Posterior leg. × 19.
 16. ,, ,, Portion of left upper wing near base. × 120.



WESTWOOD FUND.

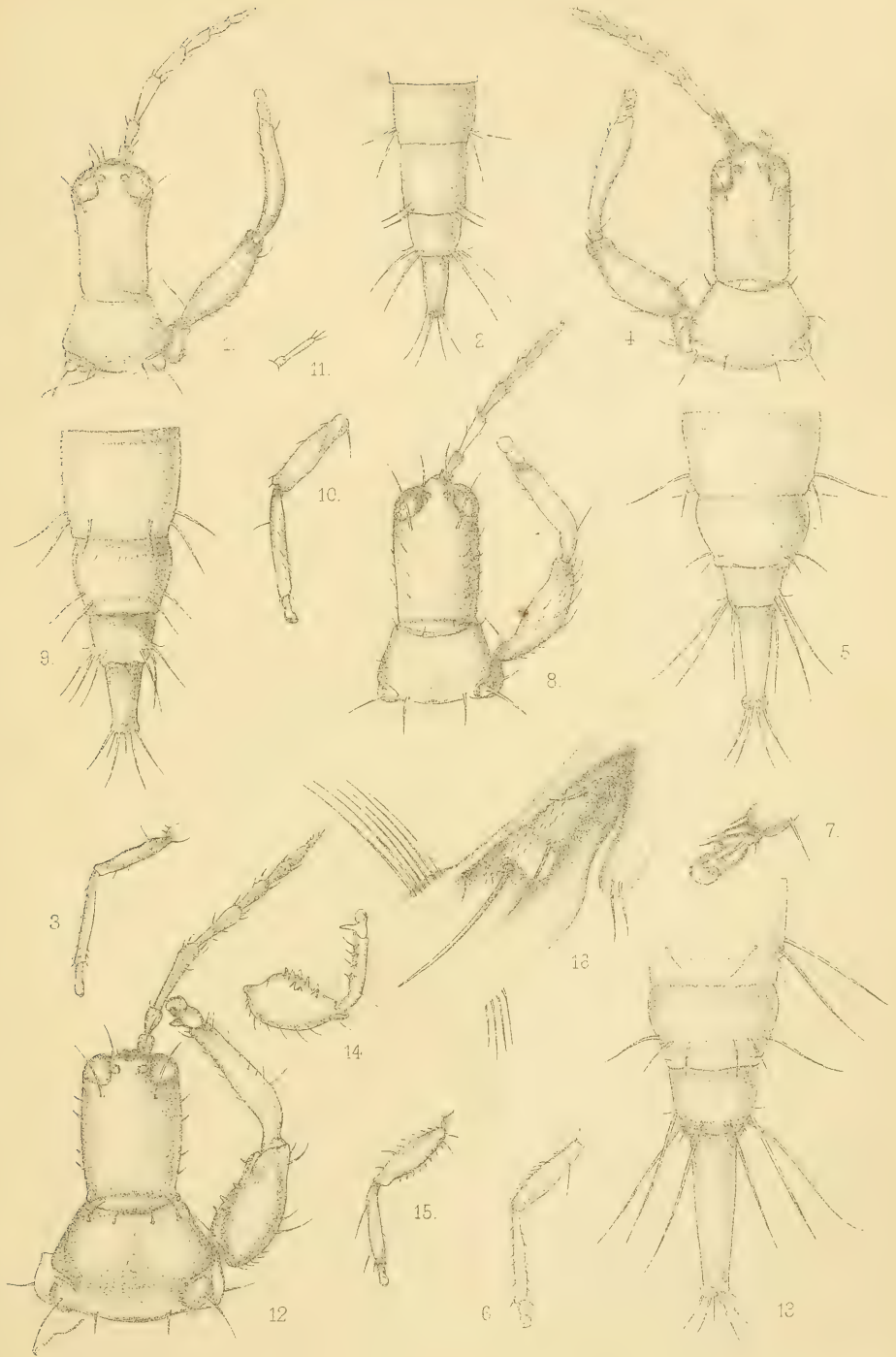
R. S. Bagnall del.
West, Newman lith.

NEOTROPICAL THYSANOPTERA.



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NEOTROPICAL THYSANOPTERA.